Claims

What is claimed is:

5   1.   System for chemical analysis of a gas sample, comprising:

a flow path,

a soft ionization source,

an ion filter including ion filter electrodes across said flow path,

an electronic input, said electronic input coupled to said ion filter electrodes for

10   generating a high-low varying asymmetric displacement field between said electrodes

across said flow path,

said asymmetric displacement field imparting transverse motion to said flow of

ion species according to mobility characteristics of said ion species and according to

extant field conditions, said transverse motion driving unwanted ion species in said flow

15   of ion species into said ion filter electrodes for neutralization thereof,

said asymmetric displacement field being compensated, said compensation for

selecting at least one ion species out of said flow of ion species and accommodating

travel of said selected ion species in said flow path to said ion outlet for detection

without said neutralization,

20   said ion filter distinguishing between ion species of an ionized NOx sample

based on differences in ion mobility in said filter field, and

said filter passing selected said ion species of said ionized NOx sample for

detection based on said compensation, and

said detected, passed, selected, ion species being identified based on historical

25   detection data of said system and on said extant field conditions.

2.   System of claim 1 wherein said detected ion species is derived from an

anthropogenic source of NOx.

3.   System of claim 1 wherein said detected ion species is derived from an in vivo source of NO.

4.   System of claim 1 wherein said detected ion species is NO and said system quantifies said detection.

5.   System of claim 1 wherein said constituents of NOx include N02, N2O4, and HN03.

6.   System of claim 1 wherein NO is detected in a positive detection mode.

7.   System of claim 1 wherein NO_2 is detected in a negative detection mode.

8.   System of claim 1 wherein total NOx is detected by oxidation of said sample.

9.   System of claim 1 wherein said means for ionizing said NOx sample is non-radioactive.

10.   System of claim 9 wherein said means for ionizing said NOx sample is photon-based.

11.   System of claim 1 wherein said detected ion species is quantified and identified based on historical detection data of said system and on said extant field conditions.

12.   System of claim 1 wherein said detector simultaneously makes negative and positive mode detections of NOx components in a gas sample.

13.   System of claim 1 wherein said detector simultaneously makes detections of NOx and hydrocarbon components in a gas sample.

14.   System for chemical analysis of a gas sample, comprising:

a differential ion mobility filter apparatus having an ion filter package with an internal flow path,

said ion filter package including and ion filter, an inlet part and an outlet part,

5   said inlet part, said ion filter, and said outlet part being coupled by said flow path,

said flow path accommodating flow of ion species from said inlet part to said ion outlet via said ion filter, said ion filter package and flow path accommodating flow of at least a selected ion species to said ion outlet,

said ion filter including ion filter electrodes,

10   an electronic part having an input, said electronic input coupled to said ion filter electrodes for generating a high-low varying asymmetric displacement field across said flow path,

said asymmetric displacement field imparting transverse motion to said flow of ion species according to mobility characteristics of said ion species and according to

15   extant field conditions, said transverse motion driving unwanted ion species in said flow of ion species into said ion filter electrodes for neutralization thereof,

said asymmetric displacement field being compensated, said compensation for selecting at least one ion species out of said flow of ion species and accommodating travel of said selected ion species in said flow path to said ion outlet for detection

20   without said neutralization,

said inlet part further including means for receiving a gas sample and means for ionizing said gas sample,

said ion filter distinguishing between ion species of an ionized NOx sample based on differences in ion mobility in said filter field, and

25   said filter passing selected said ion species of said ionized NOx sample for detection based on said compensation, and

said detected, passed, selected, ion species being identified based on historical detection data of said system and on said extant field conditions.

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15. System of claim 1 further including a combustor for the burning of fuel and controlled by a combustion controller, wherein effluent exhaust from said combustor is evaluated by said system and wherein detection of NOx is reported from said electronic part to said combustion controller to regulate said burning.

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16.   System of claim 14 further including a combustor for the burning of fuel and controlled by a combustion controller, wherein effluent exhaust from said combustor is evaluated by said system and wherein detection of NOx is reported from said electronic part to said combustion controller to regulate said burning.

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17.   System of claim 1 further including a breath capture device for delivery of exhaled breath from a patient to said inlet part, wherein said breath is evaluated by said system and wherein detection of NO is reported from said electronic part to indicate the health of said patient.

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18. System for chemical analysis of a gas sample, comprising the steps of:
    ionizer for ionizing a gas sample with soft ionization from a non-radioactive source,
    means for submitting the ions to ion related filtering,
20   means for scanning the ionized sample, and
    output for generating spectra showing NOx constituents in said sample.

19.   Method for chemical analysis of a gas sample, comprising the steps of:
    ionizing a gas sample with soft ionization from a non-radioactive source,
25   submitting the ions to ion related filtering,
    scanning the ionized sample, and
    generating spectra showing NOx constituents in said sample.

20.   A medical diagnostic device, comprising:

device for ionizing a gas sample with soft ionization from a non-radioactive source,

apparatus for submitting the ions to ion related filtering, and

5   system for scanning the ionized sample and for generating spectra showing NOx constituents in said sample.